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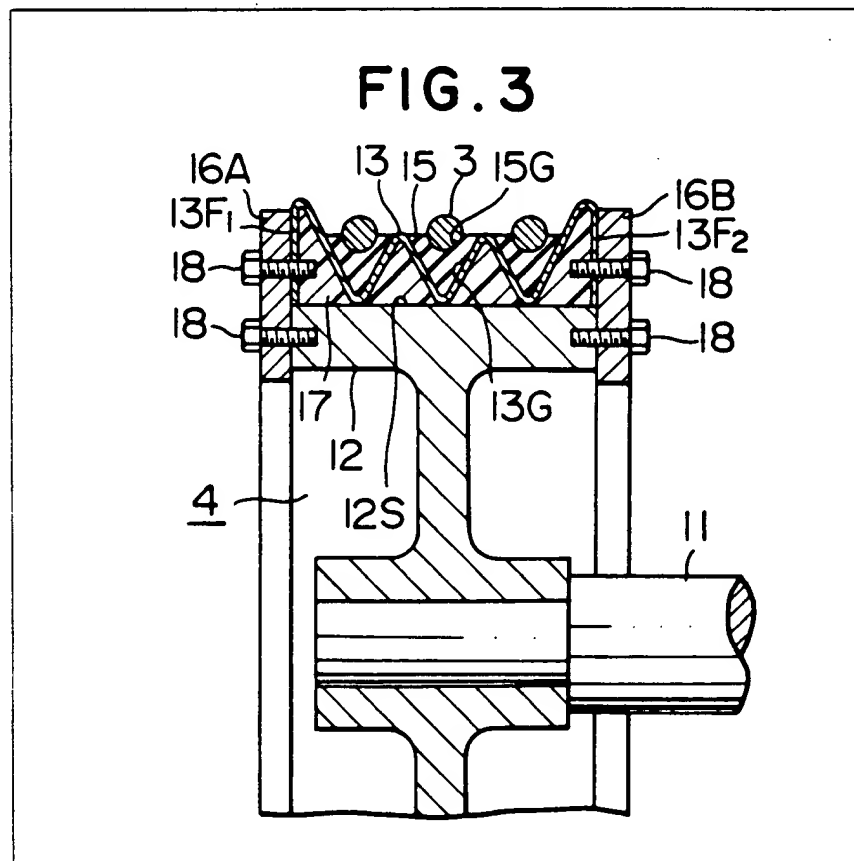
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(54) **Driving sheave for lift**

(57) A driving sheave (4) for a lift including a lining member (15) formed of a resilient organic material of high friction coefficient fitted in grooves (13G) of a corrugated ring member (13) slotted to guide a rope for hanging a suspended cage, to avoid the occurrence of slip and the development of noise between the rope and the driving sheave. The lining member is fitted in the corrugated ring member formed with grooves by performing a pressing operation on a steel sheet, to provide a unitary structure which is removably mounted on the rim.



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FIG. 1

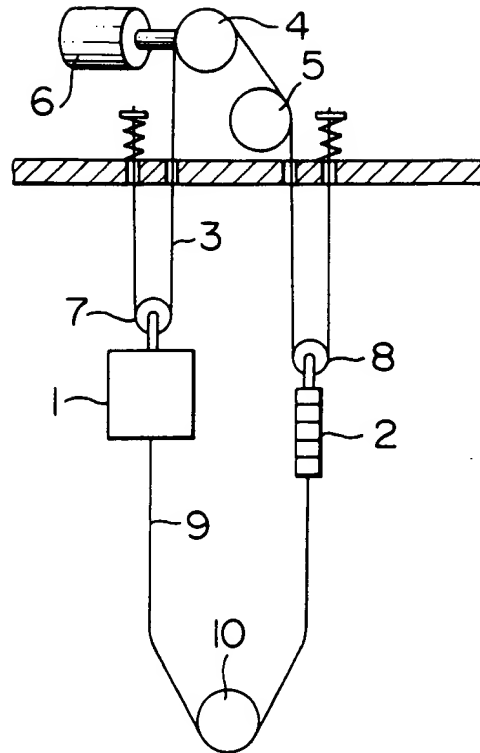


FIG. 2

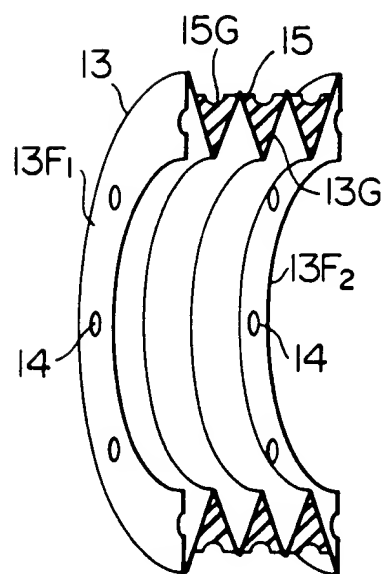
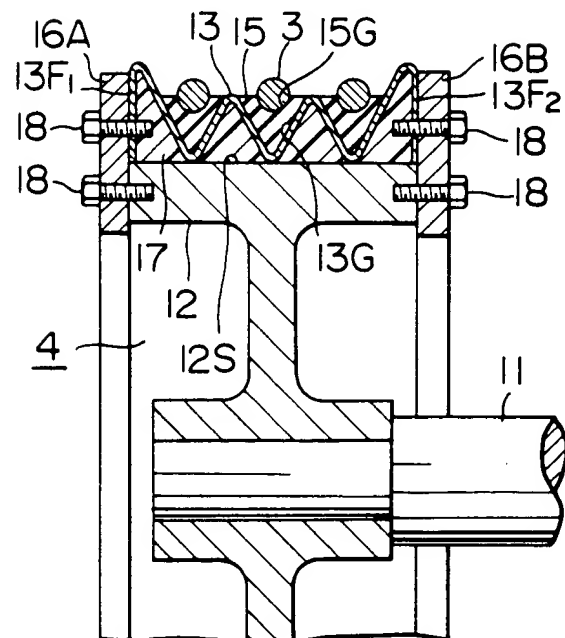


FIG. 3



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FIG. 4

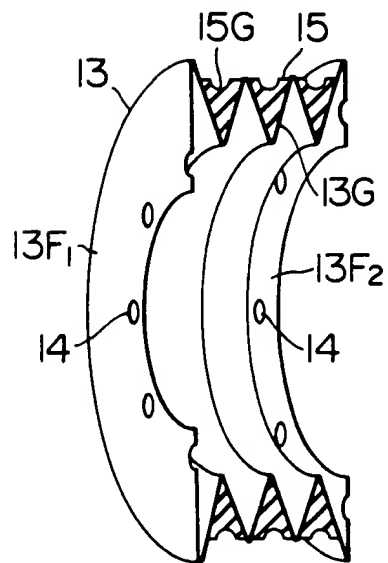


FIG. 5

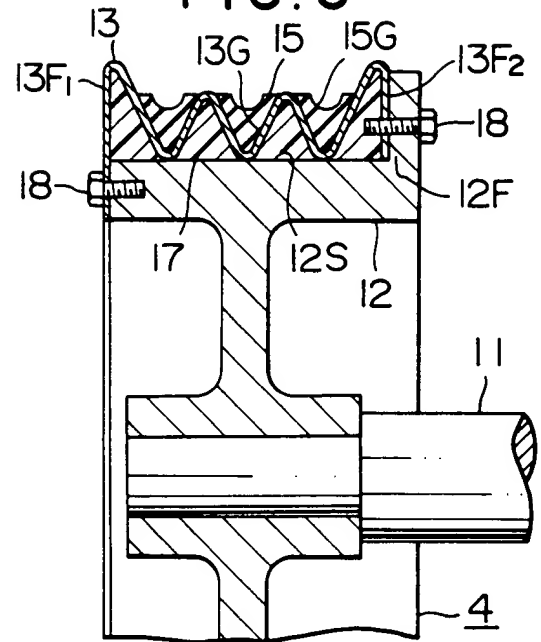


FIG. 6

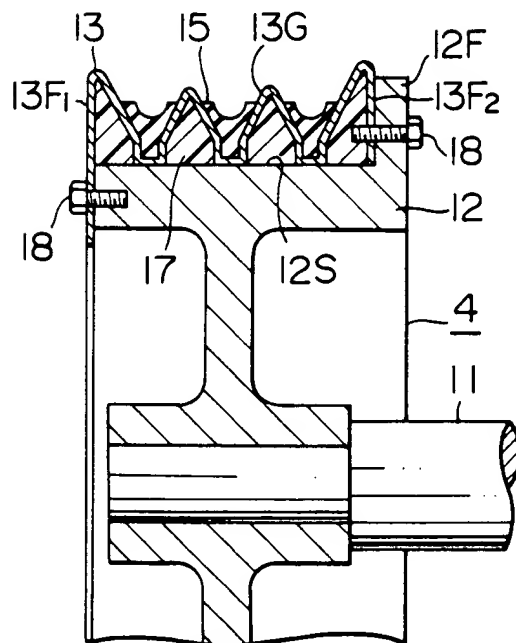
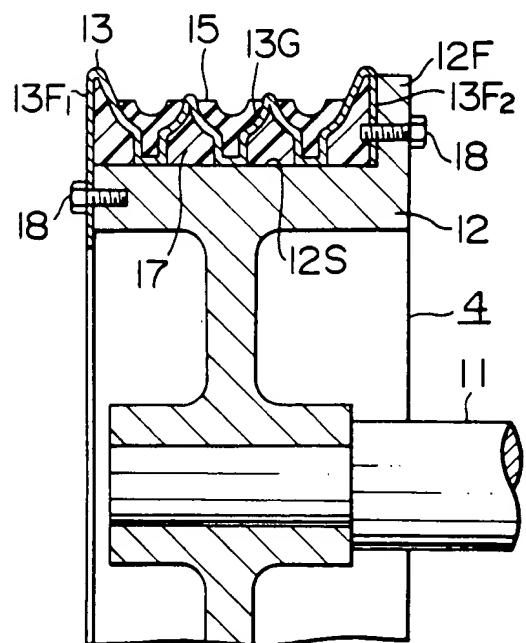


FIG. 7



## SPECIFICATION

### Driving sheave for lift

5 This invention relates to a driving sheave for a lift having a rope trained over it for hanging a suspended cage for passengers for driving the suspended cage so as to hoist the suspended cage in elevatory movement.

10 One type of driving sheave for a lift is disclosed in Japanese Patent Laid-Open No. 89181/80, for example. In the drive sheave disclosed therein, in order to avoid the occurrence of a slip and the development of noises  
15 between the driving sheave and the rope for hanging the suspended cage, a plurality of parallel grooves are formed on the outer circumferential surface of a rim formed of cast iron and supported on a rotary shaft; lining  
20 members formed of a resilient organic material, such as polyurethane rubber, of high friction coefficient are each fitted in one of the grooves; and slots are formed in the lining members for guiding a rope.

25 Owing to the fact that the rim is formed of cast iron, the problem that the lining member is fitted with difficulty in each groove on the rim is raised.

It is required by rules that the rope for  
30 hanging the suspended cage consist of more than three cables. This makes it necessary to provide more than three grooves and lining members. Because of this, machining performed on the rim for forming the grooves,  
35 fitting the lining member in each groove and replacing the worn lining member by a new one have been time-consuming and labor-wasting operations.

To obviate this problem, proposals have  
40 been made to fabricate a driving sheave by forming rings in the same number as the cables of the rope which are each formed with a groove having fitted therein a lining member formed with a slot for guiding the cables of  
45 the rope, mounting the rings on the outer circumferential surface of the rim, and fastening together the rings by bolts and nuts through side plates attached to axial opposite ends of the rim.

50 Some disadvantages are associated with the driving sheave of the type described hereinabove. The operation of machining the rings is troublesome because each ring has to be machined for forming a groove therein. Moreover, since the rings are plural in number,  
55 mounting and dismounting of the rings on and from the rim are troublesome.

This invention has been developed for the purpose of obviating the aforesaid problem of  
60 the prior art. Accordingly, a first object of the invention is to provide a driving sheave for a lift which would raise no problem in mounting and dismounting the lining member.

A second object is to provide a driving  
65 sheave for a lift in which the lining member

can be fitted to the rim readily and bonded thereto with high bond strength.

A third object is to provide a driving sheave for a lift in which the process for forming the  
70 grooves can be followed with ease.

The aforesaid objects are accomplished according to the invention by providing a driving sheave for a lift comprising a rim supported on a rotary shaft, a ring member  
75 located on an outer circumferential surface of the rim and formed with a plurality of grooves, and a lining member fitted in the grooves of the ring member, the lining member being formed of a resilient organic material of high friction coefficient, characterized  
80 in that the ring member is in the form of a corrugated ring member substantially in the form of waves in cross section formed of a steel sheet separate from the rim and provided with a plurality of grooves formed by  
85 means of a press, the corrugated ring member being removably mounted on the outer circumferential surface of the rim.

The second object is accomplished by forming  
90 the corrugated ring member of a steel sheet in place of cast iron.

The third object is accomplished by forming the plurality of grooves by means of a press.

Additional and other objects, features and  
95 advantages of the invention will become apparent from the description set forth hereinafter when considered in conjunction with the accompanying drawings.

Figure 1 is a schematic view of a lift  
100 showing the position in which the driving sheave to which the invention is directed is used;

Figure 2 is a fragmentary vertical sectional perspective view of the corrugated ring member having the lining member fitted thereto  
105 which is used with the driving sheave according to the invention;

Figure 3 is a fragmentary vertical sectional side view of the driving sheave comprising  
110 one embodiment of the invention;

Figure 4 is a fragmentary vertical sectional perspective view of a modification of the corrugated ring member having the lining member fitted thereto;

Figure 5 is a fragmentary vertical sectional side view of the driving sheave comprising  
115 another embodiment; and

Figures 6 and 7 are fragmentary vertical sectional side view of the driving sheave comprising  
120 other embodiments.

Preferred embodiments of the invention will now be described by referring to the accompanying drawings. A lift in which the driving sheave according to the invention is incorporated will be outlined by referring to Fig. 1 in  
125 which a suspended cage 1 for hoisting passengers and a counterbalancing weight 2 are hung by a rope 3 which is trained over the driving sheave 4 and a deflector sheave 5  
130 mounted in a machine chamber above a shaft

in which the cage 1 is located. The driving sheave 4 is driven for rotation by a motor 6. One of opposite ends of the rope 3 is connected to a floor of the machine chamber after being trained over a sheave 7 attached to the cage 1 and the other end is also connected to the floor of the machine chamber after being trained over a sheave 8 attached to the counterbalancing weight 2. The cage 1 and the counterbalancing weight 2 are connected together at lower ends thereof by a counterbalancing rope 9 to prevent the cage 1 and the counterbalancing weight 2 from becoming too unbalanced in weight during elevatory movement of the cage 1 to ensure the safety of the operation. To impart a predetermined tension to the counterbalancing rope 9, the lowermost portion of the run of the rope 9 is trained over a sheave 10.

As described hereinabove, a multiplicity of sheaves are used in a lift. However, it is only the driving sheave 4 connected to the motor 6 that is operative to move the cage 1 up and down in elevatory movement. The driving sheave 4 according to the invention is constructed as shown in Figs. 2 and 3 in order to increase the frictional drive force exerted on the rope 3 and prevent the occurrence of a slip therebetween. The embodiment of the driving sheave 4 in conformity with the invention shown in Figs. 2 and 3 comprises a rim 12 formed of cast iron supported on a support shaft 11, a corrugated ring member 13 and a lining member 15. The rim 15 has an outer circumferential surface 12S which is planar and smooth, and the axial length of the outer circumferential surface 12S is determined by the number of cables of the rope 3 for hanging the cage 1. The corrugated ring member 13 is formed of a steel sheet by means of a press, such as press rolling, and provided with a plurality of V-grooves 13G. Having flanges 13F<sub>1</sub> and 13F<sub>2</sub> at opposite ends thereof, the ring member 13 is substantially in the form of waves in cross section, and the flanges 13F<sub>1</sub> and 13F<sub>2</sub> are each formed with threaded openings 14 on the circumference of a circle which is concentric with the rotary shaft 11. The lining member 15 which is formed of a resilient organic material of high friction coefficient, such as polyurethane rubber, is vulcanized and bonded to the V-shaped grooves 13G of the lining member 13. Slots 15G each for guiding one of the cables of the rope 3 are formed at the surface of the lining member 15 in positions corresponding to the grooves 13G.

The unit of the aforesaid construction shown in a fragmentary vertical sectional perspective view in Fig. 2 is fitted to the outer circumferential surface 12S of the rim 12 as shown in Fig. 3. Side plates 16A and 16B bridging the rim 12 and the flanges 13F<sub>1</sub> and 13F<sub>2</sub> of the corrugated lining member 13 are attached to opposite ends of the rim 12 and

secured in place by bolts. Other bolts 18 are threadably inserted in the threaded openings 14 at the flanges 13F<sub>1</sub> and 13F<sub>2</sub> through the side plates 16A and 16B. By bolting the unit to the rim 12, the unit is prevented from moving both circumferentially and axially of the rim 12.

The corrugated ring member 13 is formed of a relatively thin steel sheet because it is fabricated by press rolling. However the use of a thin steel sheet might cause vibration and noise to be produced between the corrugated ring member 13 and the rim 12 when the rope 3 trained over the driving sheave 4 is driven thereby. To cope with this situation, a backing member 17 shown in Fig. 5, which may be formed of asphalt, rubber, synthetic rubber and the like, may be fitted in a space between the outer circumferential surface 12S of the rim 12 and an inner peripheral surface of the corrugated ring member 13 with advantage to suppress the vibration and noise which might be produced.

In the embodiment shown and described hereinabove, the corrugated ring 13 formed with the plurality of grooves 13G can be fabricated as a unitary structure by shaping a steel sheet by means of a press, and machining of the rim to form grooves on its outer circumferential surface which has hitherto been necessary in the prior art is eliminated. The number of parts is smaller and the driving sheave 4 as a whole can be produced at low cost. The corrugated ring 13 is formed of a steel sheet to which an organic material forming the lining member 15 adheres well, so that the latter can be adhered to the former with high bond strength. When wear is caused on the lining member 15, one only has to replace the corrugated ring member 13 with the worn lining member 15 by a new corrugated ring member 13 with a sound lining member 15, so that replacing worn lining members 15 poses no problem.

Figs. 4 and 5 show another embodiment which is distinct from the embodiment shown in Figs. 2 and 3 in that one flange 13F<sub>1</sub> of the corrugated ring member 13 is extended toward an inner circumferential surface of the rim 12 from the outer circumferential surface 12S thereof and a flange 12F disposed outwardly of the other flange 13F<sub>2</sub> is formed at the end of the rim 12, and that the side plates 16A and 16B of the embodiment shown in Figs. 2 and 3 are eliminated. The one flange 13F<sub>1</sub> has an inner surface of its extension positioned directly against one end face of the rim 12 and the other flange 13F<sub>2</sub> is positioned directly against the flange 12F of the rim 12, and they are connected together by the bolts 18.

The embodiment shown in Figs. 4 and 5 not only achieves the same effects as the embodiment shown in Figs. 2 and 3 but also eliminates the side plates 16A and 16B. In

addition, the number of the bolts 18 is reduced in the embodiment shown in Fig. 4 and 5 as compared with those used in the embodiment shown in Figs. 2 and 3 for securing the corrugated ring member 13 in place, thereby reducing the number of the parts. Also, assembling and disassembling of the corrugated ring member 13 can be facilitated.

In the two embodiments shown and described hereinabove, the grooves formed at the corrugated ring member 13 have been described as being V-shaped grooves 13G. However, the invention is not limited to this specific form of the grooves of the corrugated ring member 13 and grooves of the shape shown in Figs. 6 and 7 may be used with the same results. More specifically, the grooves 13G shown in Fig. 6 are shaped such that they are V-shaped grooves with a flat bottom, and the grooves 13G shown in Fig. 7 each have arcuate side walls and a flat bottom.

By providing the grooves 13G with flat bottoms, the area of the corrugated ring member 13 at which the corrugated ring member 13 is in contact with the outer circumferential surface 12S of the rim 12 can be increased. As a result, the load of the rope 3 applied to the grooves 13G can be transmitted efficiently to the rim 12, thereby making it possible to suppress noise and vibration.

From the foregoing description, it will be appreciated that according to the invention; a corrugated ring member formed with a plurality of grooves can be fabricated as a unitary structure by performing a pressing operation on a steel sheet. This offers the advantages that the machining operation relied on in the prior art for forming grooves can be eliminated, operations for fabricating the parts can be facilitated, the number of the parts can be substantially reduced, and the driving sheave can be produced at low cost. The corrugated ring member to which the lining member is attached is formed of a steel sheet to which the lining member of organic material can be adhered with high bond strength. This offers the advantages that the lining member can be adhered to the corrugated lining member with increased bond strength and the worn lining member can be efficiently replaced by a new one because the corrugated ring member having the worn lining member attached thereto has only to be replaced by a new corrugated ring member having a new lining member attached thereto.

#### CLAIMS

1. A driving sheave for a lift comprising a rim supported on a rotary shaft, a ring member located on an outer circumferential surface of said rim and formed with a plurality of grooves, and a lining member fitted in the grooves of the ring member, said lining member being formed of a resilient organic material of high friction coefficient, characterized

in that said ring member is in the form of a corrugated ring member substantially in the form of waves in cross section formed of a steel sheet separate from the rim and provided with a plurality of grooves formed by means of a press, said corrugated ring member being removably mounted on the outer circumferential surface of the rim.

2. A driving sheave for a lift as claimed in claim 1, characterized by further comprising a backing member interposed between the outer circumferential surface of the rim and an inner peripheral surface of the corrugated ring member.

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